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Co-operative Propaganda

We have long advocated in this column that sections of the industry should publish matter addressed to their potential customers, which, by all the means available, would create interest in their products. Thus, it is pleasing to announce that the British Steel Founders' Association are the first to act, and Vol. 1, No. 1, of a series of bulletins has been despatched. It was proper that the chairman of the Association, Mr. Charles S. Gill, should in the foreword remind his readers of what was so successfully accomplished in wartime through maker-user co-operation, and stress the desire of the Association so to continue in the future.

This first bulletin is rightly devoted to design. It is elementary in character and is all the better for stressing basic principles. We are sorry to see that recourse has been had to the outmoded explanation of the weakness brought about through the incorporation in design of sharp corners. The wording reads: " Where sharp corners occur at changes of section a plane of weakness is formed along the length of the inside corner. This is due to the resultant concentration of stress, but also to the formation of and growth of crystals at right angles from each face of the mould as the steel freezes. In extreme cases cavities will be found along the diagonal." We suggest this should be emended to read: " Where sharp corners exist, the sand enclosed by the angle is, during casting, heated by the liquid metal from two sides. This heat is conserved and maintains the liquid metal at this point fluid for a longer period than elsewhere. This extra fluid metal may be drawn away from the angle to leave a contraction cavity." This suggestion is made because, later on, the Association is sure to illustrate forgings showing planes of weakness, as against the homogeneity of the cast structure. Nevertheless the Association was right to " get over " the idea that re-entrant angles are to be associated with bad design. In the article " Steels for Castings," a quotation is made from the B.S.I. specifications, and here we suggest that the word "minimum " should have been introduced. We well remember how a foreign firm used these " minimum " figures as against their higher average figures to sell their castings. That is why, when quoting B.S.I. figures, their true nature should be stressed. In the large drawing offices, there is invariably to be found a well-thumbed tome, which in the greatest detail outlines the sections of the rolled material available for incorporation in engineering assemblies, plus all the germane technical data.

It should be the aim of the foundry industry to place at the side of every designer and draughtsman, a work of a similar character—one of which the recipient can be relied upon to value equally with his other works of reference. Herein is the major value of the British Steel Founders' Association bulletin, for its contents will provide the basis from which to build a really useful *vade mecum*. Moreover, it should create an urge for other sections of the industry to emulate this effort. It would be of material benefit to the foundry industry as a whole if engineers and designers were constantly in receipt of " castings propaganda," for it is more than probable that the selling points brought out by one section would be of fairly general application. Quite urgent is the case of malleable iron castings, where, if our memory serves us correctly, the pre-war consumption per head of this valuable raw material of the engineering industry was lower in the United Kingdom than in any of the major industrial countries.

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NICKEL ELECTRODE FOR CAST-IRON WELDS

Elimination of virtually all of the difficulties inherent in the welding of cast iron is claimed for a new type electrode recently announced by International Nickel Company, of New York. Known as Ni-Rod, this electrode is said to produce a stable arc in all positions, and to give a deposit that washes up evenly against the sides of the joint. It does not undercut or leave narrow grooves to trap flakes of slag that would weaken the weld as subsequent passes are made, and this, in combination with the chemical nature of the flux itself, makes it very easy to remove the slag from the bead.

The weld metal is both strong and machinable, and being of nickel, is actually stronger than the cast-iron parent metal. Fusion of the deposit and the parent metal is so thorough that it is virtually impossible to knock loose a Ni-Rod weld or overlay. Preheating is usually necessary only when a very high degree of machinability is desired, or when the structure and shape of the casting are likely to develop high internal stresses during the heating and cooling cycles caused by the arc.

The largest field for the use of this new electrode is general repair and maintenance of cast-iron parts and equipment, including welding cracked and broken castings, and building up worn surfaces such as wheels and die faces. Here the strength and soundness of the deposit is useful; machinability also may be a desirable quality in these cases, as when a casting has cracked or broken in one of its operating surfaces or across threaded holes. A second large field for this rod is in remedying minor flaws in new castings. Filling a blow hole or building up an undersize area is said to be a simple job, and when the spot has been finished by grinding or machining, the close colour-match between the deposit and the cast iron makes it almost impossible to see where the weld has been made.

Besides being useful in these two fields, the rod has been used for such production jobs as welding steel bars to a casting. Chipping the casting face, drilling and tapping are thus eliminated, and the nickel deposit produces an excellent bond between the steel and the cast iron. Ni-Rod can also be used to erase machining errors on new castings. If a cut is too deep or too long, or in the wrong place, it can be filled with an easily-machined deposit, and begun all over again.

PUBLICATION RECEIVED

Bulletin of the Association of Bronze and Brass Founders, No. 3 (July-August). (For private circulation only.)

This issue contains reports of the July council meeting, and regional meetings held in Birmingham, London, Manchester, and Leeds, which shows commendable activity. There are articles on "Deferred Repairs and Renewals"; "E.P.T. Post-war Refunds"; a laboratory testing service; "Non-ferrous Scrap Prices"; "Pattern Plates made by an Electrolytic Process," and details of the recent wage award for female workers in the engineering industry.

WEST RIDING IRONFOUNDERS' ASSOCIATION

At a dinner held on September 4 at the Victoria Station Hotel, Bradford, the West Riding Ironfounders' Association entertained Mr. T. E. Parkinson, the secretary of the Council of Ironfoundry Associations. The president, Mr. A. S. Worcester, was in the chair, and the function was also attended by leading members of the Leeds and District Ironfounders' Association.

In a speech following the dinner, MR. PARKINSON paid a tribute to the public spirited efforts made by association office bearers down the years in the work of local associations. He said that such service, which was rarely fully appreciated, had brought about the solidarity and strength of the industry which had manifested itself in the formation and activities of the C.F.A. He went on to mention a good deal of the work of this body, and described the details of events which had led up to many major decisions. He took his listeners into his confidence regarding much of the C.F.A. activities, and answered questions which were put on varied subjects.

In expressing the thanks of the members for the address given, MR. WILKINSON said that although Mr. Parkinson was a Yorkshireman, he did not follow out the traditional "do it for thisen" motto. His speech, together with current results, showed that the C.F.A. were working very hard for the individual personal benefit of the ironfounder as well as for the larger national interest of the industry, and they were deeply grateful for the work being done. He said that a good deal of capital was being made to-day by organisations out of their capacity for Government contracts, but it was quite clear from Mr. Parkinson's address that the C.F.A. stood firm as the recognised official body for the ironfounding industry, and should be strongly supported as such.

IMPORTATION OF ITALIAN FOUNDRY LABOUR

It is understood, though it is neither confirmed nor denied by the officials at the Ministry of Labour, that 2,800 Italian moulders and other craftsmen are to be brought to this country to work in the ironfoundries. This was first revealed last February in the FOUNDRY TRADE JOURNAL. Since that time the trade unions have given their not too enthusiastic consent, whilst the majority of foundry owners with whom we have spoken are lukewarm. Now that it is reasonably certain that Italian labour is to come, it is essential that the available skill should be used properly. To this end each employer should state the exact type of skilled man he requires, and each Italian should be required to outline his experience. A person well versed in both foundry practice and the Italian language should be in charge of the distribution. It is doubtful if there will be many suited for placing in the builders' castings section, but there should be many with experience in marine, electrical and general engineering castings.

STANDARD TEST-BARS FOR THE NON-FERROUS FOUNDRY

Progress towards eventual standardisation materially advanced

(*Continued from vol.* 79, *page* 454.)

WRITTEN DISCUSSION

MR. R. T. ROLFE,* F.R.I.C., F.I.M., wrote that the need for standardising test-bars, which purported to represent the quality of castings, had long been apparent. Anyone who took the trouble to cast, from the same ladle, test-bars of various types, would find considerable differences in the mechanical quality shown by them. Thus, Sans Darnis†—using various types of test-bar, separately cast from the same ladle, of an alloy very close in composition to 88/10/2 gunmetal—found extreme values of 19.5 tons per sq. in. with 29 per cent. elongation; and 11.3 tons per sq. in. with 4.5 per cent. elongation. In some tests, described below, on 86/7/5/2 gunmetal, variations of some 4 to 5 tons per sq. in. were shown for each melt by different types of separately-cast bars. The mechanical test values determined thus depended very greatly upon the form of the test-bar; and it was to be hoped that Mr. Hudson's Paper would lead to a more general appreciation of this important fact.

"Cast-on" *v.* Separately Cast Test-bars

This would inevitably introduce the question of "cast-on" *versus* separately cast test-bars. It would become obvious from the considerations above that there was a fundamental objection to making the test-bar part of the casting—that the form of the test-bar was altered by reason of the other metal to which it was attached. Again, the design and mass of this often varied greatly from one casting to another, even though the size and shape of the test-bar remained the same. The mechanical quality would also vary greatly with variation of the position of the test-bar on the casting—a factor which one should endeavour to standardise as far as possible; *e.g.*, by casting it in a standard position off a standard down-runner. In any case, however, the use of a cast-on test-bar always prevented true appraisal of mechanical quality; so that it became impossible to compare the quality of one's metal with that shown in other practice either by bars separately cast, or bars cast-on in some different manner. These circumstances were highly undesirable.

The chief reason for making the test-bar an integral part of the actual casting was the convenience of the inspector. He would then be reasonably assured that the test-bar and casting were poured from the same ladle. With a test-bar separately cast, he had either to take someone's word as to its identity with the metal of the casting, or attend at the time when the two were poured. Even then, the test-bar often could not be stamped without waiting for an impracticable period. The invalidation of the test-bar as a true basis of comparison that resulted from making it part of the casting seemed a much more important consideration than the convenience of the inspector; for, if the test-bar was not *right*, his time was wasted anyhow. That the test-bar should be right was a fundamental requirement, which could be met only by casting it separately.

He had to confess that a good deal of his experience concerned the use of cast-on bars; this, however, for reasons which will have already become apparent. Much of it covered the use of a test-bar based on that specified by the American Society for

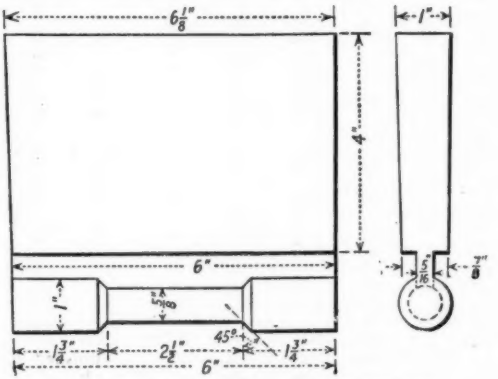


FIG. B.—A.S.T.M. STANDARD TEST-BAR FOR TIN-BRONZE SAND CASTINGS.

Testing Materials for tin-bronze sand castings (B143-42T) (as shown in Fig. B). As would be seen from Mr. Hudson's Paper, almost all users of a "standard" test-bar seemed to find it either necessary or advisable to modify it in some way or other in order to make it suitable for the circumstances of the individual case. Thus, in the writer's practice, it was found that the 0.625-in. diameter parallel portion of the A.S.T.M. bar would not always clean up satisfactorily for the 0.564-in. diameter middle portion of the test-bar. It was therefore increased from 0.625 to 0.6875 in., with an equivalent small reduction in the depth of the fin-gate, while at the same time the overall length of the test block was reduced from 6 in. to 5 in. It should be useful to give some experience with this bar, described as "A.S.T.M. modified Allen," which was still in use for gunmetal in the writer's practice.

It was tried experimentally some eight years ago at a time when the standard alloy was 88/10/2 gunmetal, and the then standard test-bars were ¾ in. square, 6 in. long, cast on one edge off a "well" at the bottom of the down-runner, at a position below the in-gate to the casting, two such bars being cast at the same time. For the purpose of comparing the mechanical

*Chief Metallurgist, W. H. Allen, Sons & Company, Limited.
†*J. Inst. Metals*, 1932, **48**, 298.

Standard Test-bars

quality as shown by the modified A.S.T.M. bar, it was thus convenient to cast this bar in the same place on the other side of the runner, as in Fig. C. The results of 35 consecutive tests on large castings with the bars thus side by side are shown in Tables I and II, respectively. Only the first of the two results from the square bars was taken, the following figures being determined:—(1) *the arithmetic mean* of all the values for ultimate strength, tons per sq. in., and elongation per cent., respectively; (2) the *deviation* or difference of each observed value from the mean figure, and (3) the *standard deviation* being the square root of the mean of the squares of the deviations of all the observed values.

The standard deviation was a measure of consistency. By subtracting it, and adding it, in turn, to the mean value, one obtained the range of value outside which not more than *about* one in three test values would fall; a relation which became an exact one if a sufficient number of tests were done. It should be clear that the estimated value of the standard deviation would become closer to the true value as the number of tests increased; and values which were truly representative could be obtained only by testing on a sufficiently comprehensive scale.

In the tests now being discussed, the modified A.S.T.M. bar gave a mean value exactly one ton per sq. in. greater than with the square bar; while the standard deviation was 0.95 as compared with 1.28 tons per sq. in. for the square bar. Its greater consistency was also shown by the fact that one result only was under 18 tons per sq. in.; while four of those from the square bar were under 17 tons per sq. in. The mean elongation value from the modified A.S.T.M. bar was 36 per cent., against 23 per cent. from the square bar; the standard deviation being, however, a little greater at 7.6 against 6 per cent. for the square bar, a difference which is, however, important, because

TABLE I.—*Horizontal ½-in. Sq. Bar Integral with 88 / 10 / 2 Gunmeta Castings.*

Cast No.	Tons per sq. in.	D	D2	Elongation per cent.	D	D2
1	19.56	+1.10	1.2100	30	+ 7	49
2	20.00	+1.54	2.3716	27	+ 4	16
3	16.08	−2.38	5.6644	12	−11	121
4	18.72	+0.26	0.0676	27	+ 4	16
5	17.76	−0.70	0.4900	16	− 7	49
6	19.60	+1.14	1.2996	32	+ 9	81
7	18.76	+0.30	0.0900	21	− 2	4
8	18.00	−0.46	0.2116	25	+ 2	4
9	16.24	−2.22	4.9284	15	− 8	64
10	17.44	−1.02	1.0404	18	− 5	25
11	20.32	+1.86	3.4596	30	+ 7	49
12	20.92	+2.46	6.0516	28	+ 5	25
13	18.04	−0.42	0.1764	20	− 3	9
14	18.64	+0.18	0.0324	26	+ 3	9
15	18.12	−0.34	0.1156	23	+ 0	0
16	19.00	+0.54	0.2916	24	+ 1	1
17	19.60	+1.14	1.2996	25	+ 2	4
18	19.20	+0.74	0.5476	27	+ 4	16
19	18.08	−0.38	0.1444	17	− 6	36
20	17.08	−1.38	1.9044	19	− 4	16
21	18.04	−0.42	0.1764	20	− 3	9
22	20.00	+1.54	2.3716	27	+ 4	16
23	20.12	+1.66	2.7556	33	+10	100
24	20.00	+1.54	2.3716	27	+ 4	16
25	15.72	−2.74	7.5076	17	− 6	36
26	20.12	+1.66	2.7556	32	+ 9	81
27	18.40	−0.06	0.0036	26	+ 3	9
28	17.36	−1.10	1.2100	15	− 8	64
29	18.32	−0.14	0.0196	30	+ 7	49
30	18.08	−0.38	0.1444	20	− 3	9
31	16.40	−2.06	4.2436	15	− 8	64
32	18.08	−0.38	0.1444	15	− 8	64
33	17.00	−1.46	2.1316	15	− 8	64
34	18.92	+0.46	0.2116	27	+ 4	16
35	18.28	−0.18	0.0324	23	+ 0	0
Total 35	646.00		57.4764	804		1,191
Mean	18.46		1.6422	23		34.03
Std. dev.			1.28			6
Range .. 18.46 ± 1.28 = 17.18 to 19.74				23 ± 6 = 17 to 29		
Tests under 17.18			6	Tests under 17 ..		7
Tests over 19.74			7	Test over 29 ..		6
Tests outside range			13	Tests outside range		13

TABLE II.—*Modified A.S.T.M. Bar Integral with 88 / 10 / 2 Gunmetal Castings.*

Cast No.	Tons per sq. in.	D	D2	Elongation per cent.	D	D2
1	20.44	+0.98	0.9604	52	+15.6	243.36
2	20.96	+1.50	2.2500	46	+ 9.6	92.16
3	20.76	+1.30	1.6900	40	+ 3.6	12.96
4	18.94	−0.52	0.2704	34.5	− 1.9	3.61
5	20.02	+0.56	0.3136	40.5	+ 4.1	16.81
6	19.04	−0.42	0.1764	33	− 3.4	11.56
7	20.52	+1.06	1.1236	40	+ 3.6	12.96
8	19.88	+0.42	0.1764	43	+ 6.6	43.56
9	18.66	−0.80	0.6400	32.5	− 3.9	15.21
10	19.80	+0.34	0.1156	38	+ 1.6	2.56
11	19.48	+0.02	0.0004	32	− 4.4	19.36
12	19.16	−0.30	0.0900	31.5	− 4.9	24.01
13	20.00	+0.54	0.2916	41	+ 4.6	21.16
14	20.12	+0.66	0.4356	42	+ 5.6	31.36
15	18.00	−1.46	2.1316	23.5	−12.9	166.41
16	19.08	−0.38	0.1444	36	− 0.4	0.16
17	21.20	+1.74	3.0276	42	+ 5.6	31.36
18	19.32	−0.14	0.0196	37	+ 0.6	0.36
19	19.04	−0.42	0.1764	28	− 8.4	70.56
20	19.92	+0.46	0.2116	42	+ 5.6	31.36
21	18.38	−1.08	1.1664	31	− 5.4	29.16
22	18.64	−0.82	0.6724	34	− 2.4	5.76
23	20.24	+0.78	0.6084	42	+ 5.6	31.36
24	18.08	−1.38	1.9044	30	− 6.4	40.96
25	18.34	−1.12	1.2544	24.5	−11.9	141.61
26	18.52	−0.94	0.8836	38	+ 1.6	2.56
27	19.28	−0.18	0.0324	33	− 3.4	11.56
28	20.84	+1.38	1.9044	42	+ 5.6	31.36
29	19.38	−0.08	0.0064	38	+ 1.6	2.56
30	19.12	−0.34	0.1156	35	− 1.4	1.96
31	19.52	+0.06	0.0036	39	+ 2.6	6.76
32	19.30	−0.16	0.0256	22.5	−13.9	193.21
33	16.70	−2.76	7.6176	18.5	−17.9	320.41
34	19.92	+0.46	0.2116	43	+ 6.6	43.56
35	20.56	+1.10	1.2100	48	+11.6	134.56
Total 35	681.16		31.8620	1,273.0		1,848.20
Mean	19.46		0.9103	36.4		52.8
Std. dev.			0.95			7.3
Range .. 19.46 ± 0.95 = 18.51 to 20.41				Range 36.4 ± 7.3 = 29.1 to 43.7		
Tests under 18.51			5	Tests under 29.1		5
Tests over 20.41			7	Tests over 43.7 ..		3
Tests outside range			12	Tests outside range		8

the mean value from the A.S.T.M. bar is so much greater. The lowest value from the modified A.S.T.M. bar, 18.5 per cent., compared with a minimum value of 8 per cent. required by the Specification.

The conclusion drawn from these tests was that the use of the modified A.S.T.M. test-bar would be more advantageous to the foundryman than that of the square test-bar; in that the test results were decidedly better; and, for the more important tensile strength value, somewhat more consistent. At that time, however, it was not adopted as the standard test-bar, the square bar continuing in use during the whole of the period over which 88/10/2 was the standard alloy; and also for a further period (September, 1940, to August. 1942) during which 87/9/3/1 was the standard alloy, with results which were quite satisfactory.

FIG. C.—METHOD OF CASTING HORIZONTAL ¾-IN. SQ. BARS, AND AN A.S.T.M. BAR ON THE SAME DOWN-RUNNER.

When 86/7/5/2 became the standard alloy, a marked discrepancy was noted in the test values obtained from bars on castings poured from 1-ton oil-fired tilting crucible furnaces and those from similar furnaces of 400-lb. size, those from the large furnaces being decidedly inferior—this for reasons which need not be discussed here. As one means of investigating the matter at the time, the method of casting the modified A.S.T.M. test-bar on the same down-runner as the square test-bars, as in Fig. C, was tried once more. (The results from a number of consecutive casts, grouped according to the size of furnace used, are given in Table III.) These mechanical test values compared with specified minima for cast-on bars of 14 tons per sq. in. and 8 per cent. elongation.

TABLE III.—*Comparison between Modified A.S.T.M. and ¾-in. sq. Test-bars for 86 / 7 / 5 / 2 Gunmetal.*

Furnace Capacity.	Casting Temperature, deg. C.	Mod. A.S.T.M. Bar.		¾-in. Sq. Bar	
		Tons per sq. in.	Elongation per cent.	Tons per sq. in.	Elongation per cent
1 ton	1,160	17.72	26	14.20	9
,, ...	,,	16.68	29	14.68	15
,, ...	,,	15.16	20	11.32	8
,, ...	,,	16.64	26	11.24	7
,, ...	,,	16.80	30	12.24	8
,, ...	,,	15.52	25	12.40	9
400 lb.	1,160	17.12	25	16.28	16
,, ...	,,	16.36	24	19.24	32
,, ...	,,	17.40	28	12.64	6
,, ...	1,200	16.20	24	18.08	26
,, ...	,,	15.80	27	19.00	32
Mean of all tests ..	—	16.49	25.8	14.67	15.3
Mean of 1-ton tests ..	—	16.42	26	12.68	9.3
Mean of 400-lb. tests ..	—	16.58	25.6	17.05	22.4

Thus, the same metal, run into moulds to form the respective test-bars at the same position in the same down-runner could show the most surprising differences in mechanical quality—differences which could apparently only arise from the varying method of running and feeding, and the varying rate of cooling, in the two types of test-bar. Whether cast from large or small furnaces, the mean strength and elongation figures of the modified A.S.T.M. test-bar had an almost constant value. Further, the variations shown by individual tests were much smaller than in the case of the square test-bar. With this bar, there was a very great disparity in the results shown by metal melted in large and small furnaces, respectively. These differences could obviously be discussed, and *explained*, at some length, but considerations of space made it here desirable only to record them. The wide divergencies in the test values from these two bars afforded, however, further evidence of the need for standardisation.

It should thus be of interest to all foundrymen to consider the test values from three casts of 86/7/5/2 gunmetal as shown by the two test-bars already discussed, but now separately cast; and the various other test-bars discussed in Mr. Hudson's Paper; where 86/7/5/2 gunmetal was not dealt with. The method of separately casting the ¾-in. square test-bar was shown in Fig. D, and that of the modified A.S.T.M. bar in Fig. E. Here this bar was shown cast together with the Keel bar modified Stone, an arrangement used for the first two casts, giving one result only for each

TABLE IV.—*Results from Various Types of Test-bar* (86/7/5/2 *Gunmetal*).

Cast No.	Remarks.	Details.	Type of Test-bar: Horiz. ¾ in. sq. (Allen).			A.S.T.M. modified Allen	Keel Bar Modified Stone.			B.N.F.M.R.A. (Shaped).	B.N.F.M.R.A. (Parallel).			I.B.F. Modified Stone.				I.B.F. Modified Eash (Shaped).			I.B.F. Modified Eash (Parallel).		
			(a)	(b)	Av.		(a)	(b)	Av.		(a)	(b)	(c)	Av.	(a)	(b)	(c)	Av.	(a)	(b)	Av.	(a)	(b)	Av.
1	Made from bought-out unbranded ingots, apparently gassed and badly pitted—Pouring temp. 1,140–1,150 deg. C.	No. ..								13.60	11.80	13.80	13.08	12.56	10.48	9.52	12.04	10.68	10.92	12.48	11.70	10.24	8.32	9.28
		Tons per sq. in.	10.64	11.52	11.08	11.28	8.64																	
		Elongation per cent.	5	8	6.5	7	4.5			13.5	12	13	14	13	7	6	15	9.3	5.5	13	9.2	10	7	8.5
2	Made from bought-out ingotsbranded C.S.R.-apparently sound—Pouring temp 1,140–1,150 deg. C.	No. ..																						
		Tons per sq. in.	16.52	17.08	16.80	16.72	16.24			17.60	16.16	16.20	16.20	16.19	14.20	16.16	16.04	15.66	16.72	14.16	15.44	13.36	13.28	13.32
		Elongation per cent.	28	27	27.5	37	40			37	31	33	34	33	20	28	35	28	33	19	26	20	18	19
3	Details as for Cast No. 2	No. ..																						
		Tons per sq. in.	13.36	15.24			17.36	14.08	15.24	14.66	13.60	15.04	14.32		14.16	15.04	15.24	14.81	13.08	13.80	13.44	14.12	14.04	14.06
		Elongation per cent.	15*	23			42	26	37	31.5	22	22	22		22	20	27	23	18	20	19	24	24	24

* Contained a large inclusion.

Standard Test-bars

bar. For the third cast, the two bars were separated, so that two results were obtained for the Keel bar modified Stone. There was also some variation in the number of B.N.F.M.R.A. test-bars, shaped and parallel, respectively, for the different casts. The metal used had been purchased as ingots of 86/7/5/2 gunmetal to B.S.S. 1023/4:1942. The test-bars were all

FIG. D.—HORIZONTAL ¾-IN. SQUARE BAR (ALLEN).

cast in greensand with a constant pouring temperature of 1,140 to 1,150 deg. C. The furnaces were coke-fired and of tilting type. No flux, charcoal, or other special treatment was employed. (The mechanical test results are detailed in Table IV.) In the case of the first melt, the ingots used were not branded or marked in any way, and the metal was apparently badly gassed and pitted. This was confirmed by the poor mechanical test values obtained from this melt. These compared with specified minima, for test-bars separately cast, of 14 tons per sq. in., with 12 per cent. elongation. With the other two melts, the ingots, branded "CSR," were apparently perfectly sound; and the mechanical test results very much better. (The analysis results from the three casts are detailed in Table V.)

For convenience of comparison, the individual, and, where possible, the average values for each type of bar, have been detailed separately, in order of tensile strength, in Table VI. (For metal of good quality, as with the second and third casts, the elongation values show a considerable margin over the 12 per cent. minimum required.) The only exceptions to this state-

ment were found with two bars showing inclusions. The results from one of these (of two B.N.F.M.R.A. bars cast together, the second showing much better values) have been disregarded, because of the large inclusion found in this bar.

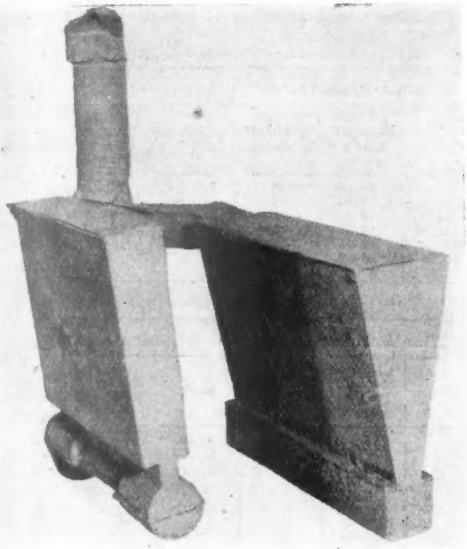


FIG. E.—(LEFT) A.S.T.M. BAR MODIFIED ALLEN. (RIGHT) KEEL BAR MODIFIED STONE.

Attention should be drawn to the following:

(1) The great variation in quality, of some 4 to 5 tons per sq. in. for each melt, as shown by different test-bars.

(2) The usually higher strength of a shaped as compared with a parallel bar.

(3) The need for standardisation arose because only then could one assess correctly the melting practice of a particular foundry. Thus, poor melting practice might be disguised by the use of a bar—possibly other than those in question—showing higher strength values. Similarly, good melting practice might not be sufficiently appreciated, because the design of the test-bar employed was such as to give low strength values. The founder would naturally prefer to use a test-bar giving the best possible test results, because he then would have a lower proportion of castings rejected on the score of mechanical quality.

(4) It having been admitted that a common defect in cast bronzes was minor porosity, due to the liberation of dissolved gases on solidification, it became obviously desirable to use a test-bar which manifested, rather than masked, this defect.

(5) From the viewpoint of hydraulic soundness, it was sometimes better for a casting to show a small distributed gas porosity, rather than for the metal to be entirely gas free; and therefore liable to show in the casting, a considerable local shrinkage. The test-bar should constitute a positive measure of gas porosity, thus affording the necessary information by which the melting practice could be suitably controlled. This might mean that the tensile test value would be considerably lower than would be found when using a test-bar, which, by virtue of its design, disguised this gas porosity effect, *i.e.*, in being comparatively gas free. Therefore, if test-bars were to be standardised, due weight should be given when drawing up specifications, *i.e.*, a lower minimum strength value should be permitted.

TABLE V.—*Analysis Results from Three Casts of 86/7/5/2 Gunmetal.*

Per cent.	Cast No. 1.	Cast No. 2.	Cast No. 3.
Sn	6.88	7.27	6.56
Cu	85.83	85.96	87.75
Pb	2.47	2.55	1.97
Fe	0.05	—	Nil
Zn	4.52	3.84	3.39
Ni	0.09	0.22	Trace
S	0.047	—	—
P	0.019	—	—
Total ..	99.906	99.84	99.67

TABLE VI.—*Results from 86/7/5/2 Gunmetal Test-bars of Varying Type set out in Order of Tensile Strength (tons per sq. in.).*

No.	Cast No. 1.	Cast No. 2.	Cast No. 3.
1	B.N.F.M.R.A. (shaped) 13.60	B.N.F.M.R.A. (shaped) 17.60	A.S.T.M. mod. (Allen) 17.36
2	B.N.F.M.R.A. (Parl.) 12.56	Hor. ¾ sq. in. (Allen) 16.80	Hor. ¾ in. sq. (Allen) 15.24
3	I.B.F. mod. Eash (shaped) 11.70	A.S.T.M. mod. Allen 16.72	B.N.F.M.R.A. (shaped) 15.00
4	A.S.T.M. mod. Allen 11.28	Keel bar mod. Stone 16.24	I.B.F. mod. Stone 14.81
5	Horiz. ¾ in. sq. (Allen) 11.08	B.N.F.M.R.A. (Parl.) 16.19	Keel bar mod. Stone 14.66
6	I.B.F. mod. Stone 10.68	I.B.F. mod. Stone 15.66	B.N.F.M.R.A. (Parl.) 14.32
7	I.B.F. mod. Eash (Parl.) 9.28	I.B.F. mod. Eash (shaped) 15.44	I.B.F. mod. Eash (Parl.) 14.08
8	Keel bar mod. Stone 8.64	I.B.F. mod. Eash (Parl.) 13.32	I.B.F. mod. Eash (shaped). 13.44

Fig. 2 of Mr. Hudson's Paper showed the I.B.F. test-bar modified by J. Stone & Company, Limited, both shaped and parallel versions being figured. Mr. Hudson noted that, with 88/10/2 gunmetal, the shaped version of this bar—the one used in the three casts

Standard Test-bars

just described—gave the highest test values both for strength and elongation; and he condemned it on the ground that "a test-bar which will give consistently high figures, whether the metal is good or bad, is not going to benefit the foundryman very much in the long run." The opinion was no doubt true. This test-bar, when used for 86/7/5/2 gunmetal, gave, however, greatly inferior results when compared with several of the other test-bars. Of course, the two alloys had different characteristics; and it might be too much

TABLE VII.—*Manganese-bronze B.S.* 208/*G.* 1.

B.N.F.M.R.A. Test-bar (Parallel).			Proposed B.S.I. Keel Bar.		
Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.	Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.
SG. 6	33.32	29	SG.82	35·40	27
SG. 9	33.48	27	SG.87	33.16	32
SG.12	34.28	25	SG.93	35.56	27
SG.16	32.80	19	SG.94	36.00	29
SG.21	33.60	24	SG.98	34·32	31
SG.27	34·08	24	SG.102	34.96	32
SG.32	33.28	29	SG.105	34·20	23
SG.41	33.36	35			
SG.53	34.40	28			
SG.48	33.88	30			
SG.58	35.92	27			
SG.64	35·32	30			
SG.69	34.64	35			
SG.77	34.36	31			

TABLE VIII.—*Gunmetal B.S.* 1023/4.

B.N.F.M.R.A. Test-bar (Parallel).			Proposed B.S.I. Keel Bar.		
Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.	Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation
SG. 5	16·52	30	SG. 83	16.40	21
SG. 8	16.52	32	SG. 85	13.56	20
SG.13	16.40	29	SG. 91	15·92	26
SG.17	16·00	25	SG. 92	14.40	20
SG.20	16·20	29	SG. 95	17.32	23
SG.26	16.64	35	SG. 96	14.60	27
SG.33	16.88	31	SG. 99	18·08	35
SG.39	16.76	21	SG.101	16.92	35
SG.51	17.36	31	SG.106	16.56	24
SG.49	16·44	27			
SG.61	15.80	29			
SG.63	16.80	23			
SG.70	16.96	27			
SG.76	16.88	34			

to expect that one could standardise the same test-bar for a number of different alloys. Clearly, however, the matter required a great deal of further investigation before such standardisation was attempted.

Mr. Hudson gave a number of results of 85/5/5/5 gunmetal, the alloy most closely resembling 86/7/5/2 gunmetal, as tested by the writer. Here, again, there were marked discrepancies in the order of tensile strength of the various bars. In the writer's tests, the B.N.F.M.R.A. shaped bar appeared to give on the whole the best results; while the Keel bar (modified Stone), which Mr. Hudson noted as giving particularly consistent test figures, gave only poor to average results for tensile strength.

Mr. Rolfe concluded that therefore it was to be hoped that a much more systematic and statistical investigation would be made of any proposed test-bar—

TABLE IX.—*Gunmetal B.S.* 1021/2.

B.N.F.M.R.A. Test-bar (Parallel).			Proposed B.S.I. Keel Bar.		
Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.	Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.
SG.15	17.80	33	SG. 84	17.84	27
SG.31	17·04	17	SG. 86	15.88	22
SG.36	18·96	30	SG. 90	18·20	44
SG.38	16·40	29	SG.100	19·40	37
SG.55	16.40	28	SG.104	18·88	33
SG.78	18·52	32			

TABLE X.—*Gunmetal* 83/7/5/5.

B.N.F.M.R.A. Test-bar (Parallel).			Proposed B.S.I. Keel Bar.		
Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.	Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.
SG. 7	14·12	20	SG.103	15·88	27
SG.14	17·52	30			
SG.18	14.92	25			
SG.22	15·80	29			
SG.30	16·28	32			
SG.34	17·84	27			
SG.42	15·32	24			
SG.50	15·96	27			
SG.56	15·56	21			
SG.59	16.80	30			
SG.65	17.44	33			
SG.74	17.36	33			
SG.79	15·84	25			

TABLE XI.—*Phosphor-bronze.*

B.N.F.M.R.A Test-bar (Parallel).			Proposed B.S.I. Keel Bar.		
Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.	Mark.	Ultimate Strength, Tons per sq. in.	Per cent. Elongation.
SG. 1	15·24	6	SG.89	12·40	4
SG. 3	14·80	5	SG.97	15·40	5
SG.10	15·12	5			
SG.19	14.00	6			
SG.24	13·72	5			
SG.46	13·36	4			
SG.52	14·24	5			
SG.66	13·88	4			

particularly the suggested new version of the Keel bar—before any attempt was made to standardise it for any alloy.

MR. J. C. W. DAVIES wrote giving the results of tests carried out during the past six months in the English Electric Company's non-ferrous foundry at

Stafford, on gunmetals, phosphor-bronze, and manganese-bronze, using first the B.N.F.M.R.A. parallel test-bar and later the proposed B.S.I. Keel type bar. (These are Tables VII to XI.)

Except for the phosphor-bronze bars, which were poured in dried moulds, all other bars were cast in green sand moulds. The sand used in the tests was synthetic and of the following properties:—Moisture, 4.5 to 5.0 per cent.; A.F.A. green compressive strength, 8.5 to 10.0 lb. per sq. in.; A.F.A. green permeability, 35 to 45; all test-bars were machined to 0.564 in. diameter.

The composition of the manganese-bronze was approximately 58 per cent. Cu; 1.0 per cent. Al; 0.7 per cent. Fe; 0.4 per cent. Mn; balance Zn. The composition of the phosphor-bronze was 11.0 to 11.5 per cent. Sn; 0.4 to 0.55 per cent. P; 0.5 to 1.0 per cent. Zn; balance Cu. This was an English Electric Company's specification, and the mechanical properties required were 14 to 18 tons per sq. in., and 4 to 8 per cent. elongation.

On the whole their experience suggested that there was little to choose between the two types of bar, but as regards the gunmetals to B.S. 1021/2 and B.S. 1023/4, there appeared to be slightly greater consistency with the B.N.F.M.R.A. design, and they had always been impressed with the economy in metal to produce the latter bar.

It was generally not possible to check the actual casting temperatures of the bars, and pouring temperatures may have varied considerably over the period during which the tests were made.

All gunmetals were melted with 1 to 2 per cent. manganese ore, and deoxidised with phosphor-copper before casting.

AUTHOR'S REPLY

MR. F. HUDSON, in a written reply, said that the test results and remarks submitted by Mr. J. C. W. Davies were particularly gratifying, and confirmed that with suitable technique, the design of Keel bar finally put forward was likely to provide a satisfactory basis for standardisation purposes.

Mr. R. T. Rolfe's contribution to the discussion is of very great value inasmuch as it outlines a series of detailed tests with a slightly modified form of the A.S.T.M. bar and provides a comparison of the effect of test-bar design on 86/7/5/2 gunmetal. Time did not permit either of these two points being dealt with in the Paper, and Mr. Rolfe's remarks complete the story.

The A.S.T.M. bar, as modified by W. H. Allen, Sons & Company, Limited, undoubtedly gives good results for gunmetal and bears a close resemblance to the design of Keel bar finally recommended as a tentative standard as shown in Figs. 10 and 11 in the Paper. The modified A.S.T.M. bar differs from the latter inasmuch as it incorporates a shaped bar and does not quite provide, theoretically at any rate, such positive feeding action. It might be assumed, therefore, that the modified A.S.T.M. bar would not be too satisfactory for those alloys having high liquid shrinkage such as aluminium, bronze and high tensile brass. It could not, therefore, be adopted as a standard bar for all alloys without further alteration in design and any modification would probably be towards the form of Keel bar recommended. The results outlined by Mr. Rolfe thus tend to confirm the usefulness of the Keel bar design for initial standardisation purposes.

Effect of Test-bar Design on Gunmetal

Regarding the effect of test-bar design on 86/7/5/2 gunmetal, it is obviously unwise to arrive at any definite conclusions on test results from an individual foundry, but it is interesting to note in Table IV the value of the Keel bar for distinguishing between good and bad metal. With metal containing an appreciable amount of gas, the orginal design of Keel bar, as shown in Fig. 1 of the Paper, gave a tensile test of 8.64 tons per sq. in. with 4.5 per cent. elongation. With metal containing less gas, no difficulty was experienced in obtaining a maximum strength between 14.08 and 16.24 tons per sq. in. with 26 to 40 per cent. elongation. With completely degassed metal, these figures could probably be exceeded, and if one also takes into account the minor modifications made to the original Keel bar design to obtain slightly faster cooling conditions, *e.g.*, the alteration from 1 in. square to 1 in. dia. round, then little difficulty should be experienced in meeting specification requirements so far as 86/7/5/2 gunmetal is concerned with the design of Keel bar finally recommended.

Control of Melting Practice

Mr. Rolfe has commented on the fact that the test-bar should constitute a positive measure of gas porosity, thus affording the necessary information by which the melting practice can be suitably controlled. This might mean that the tensile strength value would be considerably lower than would be found when using a test-bar, which by virtue of its design, is not sensitive to the effect of gas. He suggests, therefore, that if test-bars are to be standardised, due consideration must be given when drawing up specifications to permiting lower minimum strength values. This latter point may not be altogether practical at the present time, but it should be emphasised that whilst the design of Keel bar recommended has been designed to give a positive indication of gas porosity, it should also be quite capable of meeting *existing specification* requirements when cast with metal in a *suitably degassed condition.*

Regarding Mr. Rolfe's concluding remarks that a more systematic and statistical investigation should be made before any particular design of test-bar is standardised, surely this can best be accomplished by adopting a tentative standard along the lines suggested and seeing how this works out in practice over the next few years.

ON AUGUST 1 the Ministry of Labour cost-of-living index figure was 105 points above the level of July, 1914, showing no change compared with a month earlier.

LOOKING FORWARD IN METALS

By "ONLOOKER"

The most recent news in the scrap situation suggests that the Ministry of Supply have increased the original tonnage of brass scrap shell cases and secondary 70/30 ingots earmarked for refining in the United States and Canada from 100,000 tons to about 150,000 tons. It will be remembered that this secondary material is to be shipped from the U.K. during the ensuing months, copper, presumably electrolytic in quality, being returned on a toll basis. This means that out of the increased figure mentioned above something like 100,000 tons of virgin copper should be returned, but, presumably, the zinc will "go up the stack." By means of a proper layout, zinc fume (oxide) can be trapped, and this practice is carried out in this country, but the method is pre-refining and not electrolytic deposition. It has been pointed out that the Ministry's plan for exchanging old brass for new copper, results in a loss of zinc to this country, and this is quite a serious matter, although generally speaking the world supply situation in this metal is not regarded as so serious as is copper. This is doubtless due to the fact that whereas in zinc it is only a question of two grades, *i.e.*, electrolytic and G.O.B., there are at any rate three divisons in copper and also a sub-division into a variety of shapes and sizes.

Foresight Lacking

The market has now had a chance to weigh up the pro's and con's of the Government's decision to "convert" brass into copper, and in view of the uncertain outlook at the various copper producing centres, reaction on the whole seems to be in favour of the plan. It has been suggested that the job might have been put through in Britain without calling in aid from overseas, but such capacity as there is here is very fully occupied and it is extremely doubtful whether anything could have been arranged. Once again the question of an electrolytic refinery crops up, and one can reflect regretfully that had this scheme been put through either before the war or during the early days, the British could have undertaken this transformation job unaided. However, it is too late to think of that now, for even if the plan were put in hand at once a long time would elapse before the refinery was in being. And in the meanwhile copper supplies here might have given out! There are, of course, in this country, copper refineries which are capable of turning out in the aggregate large tonnages of refined copper, but the basis of their operations is a plentiful supply of blister copper of known purity and/or high-grade copper scrap. Both blister and secondary copper are in somewhat short supply to-day, although one might be excused for believing that at the ruling price level, holders of copper in any form would be only too glad to make sales in as big a tonnage as possible and for as far forward as could be arranged. This is an aspect of the scrap situation which it is understood has been brought before the disposals section of the Ministry on a number of occasions by the trade, and a concession was actually made which enabled consumers and merchants to buy for delivery in the current and three following months. Apparently the consumers are still not altogether happy about the arrangement and they are believed to be anxious to enjoy the facility of making purchases for six months ahead, the same as in virgin metals.

It has been suggested recently that in a general sense there are signs of an approaching end to the sellers' market, and some people are going so far as to say there will not be any further increase in the sterling price of copper. This takes some believing, for both the American and the British governments are understood to have paid 15¾ cents f.a.s. for substantial tonnages to be shipped before the end of this year. However, the best informed opinion takes the view that if copper goes over £90 here, consumption will be checked and it may then turn out in due course that Britain has reached the top—and passed it! It is, of course, easy to adduce reasons why the present condition of scarcity, which plays into the seller's hands, should last for quite a long while yet, but experienced market men know that a change can and does happen at very short notice and without any special factor compelling it. That is what all interested parties have to guard against, and there is always the fear that a sudden drop may lead to buyers defaulting on their contracts. It *may* be this possibility which makes the Ministry nervous of committing themselves too far ahead in scrap, which stands to-day at prices not seen in this country for almost 20 years. Just because of the inflated value, fabricators in their turn are cautious, and there cannot be much doubt that they are buying only against orders they themselves receive from their customers. Truth to tell, there is a rather different feeling about non-ferrous metals as an investment to-day than there was a few months ago. Zinc, too, which at the time of writing is still at £300, is due for a rise, and therefore gunmetal and bronze scrap may be a good lock-up, but in copper and brass the merchants are taking the view that the amount of appreciation to be expected is not very much. Their idea now, therefore, is to buy for a quick profit.

NEW SHOPS FOR APPRENTICE TRAINING

Leyland Motors, Limited, Leyland, Lancs, have commenced rebuilding and extending the apprentices' training centre. When completed it will be a self-contained model engineering works. The centre will cover approximately 25,000 sq. ft., and will contain for the first time a laboratory, drawing and designs office, ferrous and non-ferrous foundry, a smithy, coppersmiths, boilermakers, sheet metal section, and also electrical and plumbing. An engine test bench will be installed for research work and recording data of the units being built by the trainees. There will also be a lecture room with a complete projector equipment.

MALLEABLE IRON FACTS (No. 23), the bulletin of the [American] Malleable Founders' Society, Union Commerce Building, Cleveland, Ohio, stresses the advantages of using malleable iron castings for shock absorbers.

SOME ARMY FOUNDRY EXPERIENCES*

By MAJOR J. ROBERTSON

[SLIGHTLY ABRIDGED]

Like the civilian those on service shared the problems of long hours, lack of suitable materials and manufacturing problems, plus the added burden of military administration and security measures which consisted of guards and protection. It was his privilege to have been seconded to the Royal Electrical and Mechanical Engineers, a corps which was formed in the latter part of 1942. Their function and work was the result of concentrated repairs required for the mechanised warfare in North Africa. Immediate replacements of spares and the carrying out of repairs often under fire formed an important part of the unit's work.

Briefly, there were four echelons, the first, well up; the second, immediate assistance and longer repair hours; the third established as advance base workshops; and fourth, the port and city base workshops. The ages and qualifications of the members in each echelon can be well appreciated. It was always a debatable point why an older man with considerable and matured experience should not be allowed to get well up towards the front. It will be seen that the foundries were set up in the third and fourth echelons.

Egyptian Foundry

The Egyptian main foundries were kept busy in maintaining large railway commitments. Egypt, without timber and coal, had these foundries concentrated in the larger cities. It was necessary for the military authorities to assist in working larger private establishments and to employ Egyptian tradesmen, with the best available military craftsmen as supervisors. There was little chance of bringing out foundry equipment through the Mediterranean, so much ingenuity and industry was required of everyone to increase production.

In the Author's small workshop there was a centrifugal casting machine making bushes for piston rings. It was experimented with in order to further their cause. The making of domestic items such as stove parts for hospitals and camps was another feature apart from battlefield requirements. Blocks were cast of iron for the formation of dies and presses for the plastic department. Here was moulding practice leaving its own core in most instances. Another important part of the workshop was the making of patterns and castings for inventions. There were many ideas sent in to headquarters, from servicemen of all services and of all ranks.

The experimental section in the foundry prepared tests, kept records and gave much useful advice and many suggestions in connection with the many ideas offered by fellow servicemen.

In Italy

In Italy, labour and craftsmanship were definitely of a higher standard. Good workmanship is almost an obsession with the Italian craftsmen, as is evident from their famous bronze statues of heroes, and fine church ornaments. It was not the Author's good fortune to have seen any Italian statue foundry at work.

Electricity was greatly used, there being no coal or coke in the southern parts where the work was carried on. The Navy greatly assisted with supplies. In such an area of naval activity there were many electrical furnaces, mechanised systems on good production lines and reflecting good methods. The partly demolished works where the company worked must have been one of the cleanest and most efficient in the country before demolition. It is a well known military factor that "blowing up" indiscriminately is a waste of time. Broken bedplates and lathe beds serve the cupola and are easily recast and reset. The various ladles, lifting tackle and moulding boxes which formed part of the foundry yard were soon in action to their benefit. Many metal moulds and dies found under the ruins were of assistance in casting solid blocks, rods and shapes. Everybody learnt something from the construction of these moulds.

Approximately 120 ft. in length and 50 ft. wide, the foundry was partitioned into numerous bays, including a small iron bay and a large brass bay. Débris from the shattered roof covered all the equipment, but this was soon cleared and the equipment was sorted out for further use. Core ovens, with railway tracks, were immediately put into operation. The immediate construction of a cupola was agreed upon, and the success of this important job was due to the work of the few moulders. A call for pattern-makers and moulders soon took effect, with a few joining every month, and always there was a "find" in some particular section, such as a smelter, a core-maker, a die-caster or machine operator. These lads formed a very fine team both in work and other activities.

No Pyrometers Available

The cupola had air blown through oppositely situated tuyeres, which necessitated the putting down of small pieces of broken scrap and pig-iron. The amount being about 1½ tons per hour and casting three times a week, very hot metal was poured and grey iron obtained to the best of their experiences. It was not easy to control, and no pyrometers were available. From the large amount of smoke, her efforts and position, she was called "Good Queen Bess," one of those humorous names given at the right moment by soldiers.

The original foundry had done much die casting and had only a small experimental sandbay. Thus a search had to be made for sand, which eventually was obtained near Rome. A pug mill was set in operation and sand was prepared by trial and error. Though the original plant had been well planned and had

*A Paper presented to the South African branch of the Institute of British Foundrymen.

Some Army Foundry Experiences

electric furnaces set out, these had been demolished, and it took some time to assemble an odd one. Then the power did not function satisfactorily or the electrodes were in short supply, so that the result hardly warranted all their efforts.

A part was set aside for brass moulding, and when the roof was erected results were seen. The scrap brass-bronze and aluminium was obtained from salvage depots until they gradually built up bins and sorted out this salvage. It was found that an odd fuse cap or powder core among such salvage went off with a bang.

The foundry was developed by erecting a cupola outside the columns. This cupola was obtained from a badly bombed area, transported in sections and generally fabricated on site. The brick lining was obtained through the assistance of a South African engineering unit many miles away. The ganister for lining was obtained from an American unit nearby. There was good feeling and co-operation about, and with the improving military situation on the continent the efficiency and output steadily improved.

A large top part moulding box was required which was fabricated in plate, barred and welded by another section of the works down the coastal road. The interest in the combined achievements was shared by all. The sand blasting plant was soon put into action after the roof was patched. An air line was connected and a nozzle was cast using a small metal rod to chill the outlet. Then a bronze nozzle was made partly cored and partly drilled. Sea sand of large grit was used until it was thought that it had become too dusty. Many greasy cooking utensils and partly rusty military equipment were easily cleaned by using the sand blasting plant.

An endeavour was made to operate economically and turn out quality articles such as fan and driving pulleys, stove parts, engine manifolds for tank repairs; machine and tool parts were cast in iron. They manufactured bronze handwheels, bearing bushes, valve bodies for naval requirements, aluminium number plates, and the general requirements for a manufacturing workshop.

Technical Circulars

Circulars of modifications and alterations to equipment were received as were deemed necessary. These were the results of experience on all battle fronts. Then available materials, short supply materials and local contracts were also items to be studied. The organisation allowed for an inspectorate which was a picked section of men whose work it was to inspect, pass or reject, and advise. They were a unit under their own officers, and though their censure was not wanted they were well respected and they were certainly necessary.

The chemical and metallurgical laboratory was a small unit staffed by highly qualified personnel. Their assistance was necessary when using foreign materials, which often gave varying results. They were always preparing reports on materials for the forces.

Personnel

Some of the finest craftsmen from Great Britain were employed, and they were well rewarded by awards and the appreciative remarks of the staff. These craftsmen (and such was their designation) were graded and given tests at different periods, the passing of which increased their pay and kept them up to civilian standards.

The Human Factor

Enlarging on the subject of the purely "military" problems encountered by army foundrymen, it is germane to record that the human factor which arose from the fact that the men were far away from their homes was a factor which always required the closest consideration. It was not easy to look after the men's morals and their morale—a job which required understanding and real sympathy. No man felt really secure under active service conditions, miles from home, and it was too much to ask that the feeling of insecurity should not have certain repercussions on a man's work. These "military" problems ran side by side with the many problems similar to those which were encountered by foundrymen on the home front, including the necessity for long hours of work, the lack of suitable materials, etc.

The R.E.M.E. were a corps formed distinctly apart from the Royal Engineers, who handled all sort of field jobs, including the laying of mines, the disposal of enemy mines, bridge building, etc. The formations in the R.E.M.E. were truly artisan groups, and there were four clearly-defined echelons in the organisation. The advance workshops, close to the front line, were responsible for immediate repairs to tanks, motor vehicles, etc., all their jobs being accomplished in a maximum of six hours. Other workshops further to the rear handled work which proved too much for the advance workshops, and the heavier work (including the manufacture of urgently required spare parts for engines and stove parts, etc., for field hospitals) was undertaken by foundries erected in the advance base workshops and the base workshops.

In Egypt

In opening his Paper, the Author made the following statement:—

The foundry to which the Author was attached in Egypt was staffed mainly by Egyptians, including students of an Egyptian university which catered for the engineering industry only—although the Egyptian conception of engineering included wood-work, carpentry, and even stone masonry! When the R.E.M.E. took over, the Egyptians worked with the army men and watched them very closely to pick up as many tips on foundry work as they possibly could. The cupola would be fired by the Egyptians one day and by the army men the next day. On the whole, the relations between the students and the engineers were excellent. The students were often at a loss when making castings, not knowing whether they should fasten them down, weld them down, or cast them in one. They were very keen on their work, however, and they soon learnt.

The Italian Foundry

The Italian foundry of which Major Robertson was put in charge was situated some 18 miles north-west of Naples, very close to the sulphurous waters of Lake Avernus. It was within easy distance of the famous honeymooners' haunt, Sorrento, and the equally famous Isle of Capri. While reading his Paper, Major Robertson showed a coloured map of the district to illustrate the difficulties which were encountered in searching for locations of suitable sand for moulding purposes. For many miles around Mount Vesuvius there was nothing to be found except volcanic rock and soil with a lava content. Eventually, suitable red sand was found many miles away in the vicinity of Rome.

Major Robertson had some amusing stories to tell about the "business" capabilities of the Italians in the district. Often he found it impossible to locate small pieces of machinery, tools, crucibles, etc., which he knew very well had formed part of the foundry equipment. A few days after their disappearance, articles would be brought in by one or other of the employees who had "found" them not far off, and who would offer them for sale. Coal also disappeared with alarming regularity—sometimes it would be found stacked high on a farm in the locality. When investigations were made, explanations always ran on the same lines. The owner of the farm had been killed in the invasion, and nobody else on the farm knew how the coal had got there; or the owner had left for an unknown destination and would be absent for a very indefinite period; or the coal had been there before the invasion; or the coal had belonged to the Germans, who left it there in their hurry to get away.

Labour Plentiful

The foundry was built in two sections in hilly country, the sections being joined together by a tunnel 1½ miles long. Calls for labour were made as soon as the R.E.M.E. arrived on the site, and labourers came in quickly and in astounding quantity. Many of the prospective employees knew nothing about foundry work, but they presented themselves on the strength of the fact that their fathers or grandfathers, or some distant relatives, had worked there either before or during the war—and most of them were accepted! Whole families would come seeking employment, including mothers and daughters. Often the women were found to be of inestimable value, prepared in many cases to work harder and with more care than the men. Some very fine craftsmen were sent out from Britain, among them men who had served for years with infantry regiments.

DISCUSSION

Problems in Egypt

CAPTAIN SIMPSON, who was attached to the S.A. Engineering Corps throughout the war, congratulated Major Robertson on his excellent Paper, which had given a clear illustration of the work undertaken by a typical army foundry during the war. Captain Simpson said he had been in charge of an army foundry in Egypt for 17 months, and in that time the sand problem had put years on his age. In his foundry, his men had used a sand mixture made up of 60 per cent. desert sand and 40 per cent. Nile mud! A very mixed collection of civilian moulders had been employed—black, white, and of uncertain colour. One morning, said Captain Simpson, he had arrived at the foundry site to find his men standing in groups outside the building. They explained that they were waiting for the labourers, who at the time were undergoing some sort of medical examination or inspection. Captain Simpson naturally asked why they saw fit to wait, and why they could not see their way clear to starting work without them? A spokesman gave the reason: "Well you see, sir, there are fleas in the foundry, and we always wait for the labourers to go in first to take the brunt of the attack!"

Fuel difficulties also had been a great source of worry. Captain Simpson recalled a very unusual bargain he had struck with an army colleague who asked him if he had any moulders to spare. He had as it happened a good many moulders, a few of them good, some bad, some very indifferent, and he traded with his colleague one moulder for two bags of fire-wood! Bombing raids added appreciably to the general difficulties of working conditions in Egypt. At one time, when things were going badly for the Allies in the desert, raids were almost a nightly feature over a period of seven months. Working hours were from seven to five. Thoroughly tired after the day's work, the men would settle down for some rest shortly after their evening meal. With almost unfailing regularity, air-raid warnings would pierce the quiet at nine o'clock—and from then until five in the morning the men would crowd together sleeplessly in the air-raid shelters, to be back at work again at seven o'clock.

Deserving of Gratitude

MR. CACHET said it gave him great pleasure to pass a vote of thanks to Major Robertson for his excellent Paper. "We in South Africa had our war troubles," he said, "and because we were often so hard pressed here it was difficult for us to appreciate fully what our foundry friends were going through in the forces, and sometimes it was difficult to appreciate the value of the work they were doing. Major Robertson has certainly shown us how army foundrymen faced and conquered their problems."

"Listening between the lines," said Mr. Cachet, he felt that Mr. Robertson had made things sound rather more pleasant than they had been in reality. The work which had been accomplished by the army engineering units under conditions of great difficulty deserved the gratitude of the nation itself and of the world as a whole. The outcome of the war had depended largely on production, and although production at home had, of course, been of the greatest importance to the successful prosecution of the war, victory could not have been possible without the repair and production work accomplished by engineering units in the various theatres of war.

(*Continued overleaf, foot of col.* 2.)

INCOME TAX ASSESSMENT PROCEDURE UP TO DATE

By F. J. TEBBUTT

With the Finance Act, 1946, now law, this explanation is given of income-tax assessment procedure, mostly for Schedule D (business profits: persons on their own account) taxpayers. In passing, however, some reference to Schedule E will be made (employments) taxpayers. This applies to current use, *i.e.*, as regards assessments which will attract tax payments, January 1 and July 1, 1947 (two equal instalments).

Pertinent Points

Treasury Tax Reserve Certificates taken out in advance of tax payments receive interest, and this interest is not assessable; E.P.T. and National Defence Contribution payments are deductible for income-tax purposes. Amounts for War Gratuities (*i.e.*, arising from service in the armed forces, etc.), are not chargeable with tax.

If an employer contributes to the cost of purchases of savings certificates for employees, part of the contribution is deductible as a trading expense; in most cases 10 per cent. of the outlay is allowed. Some employers make gifts of goods to employees, and these are not assessable, and if, owing to the shortage of goods, savings certificates or other Government savings investments are given instead, these are not taxable on the recipient. Ordinary bonuses (*e.g.*, Christmas additions) given employees are, however, taxable on the recipients, but the amount is deductible by the employer as a trading expense.

Research Costs Allowable

Certain expenditure on scientific research is allowable as a trading expense, good examples being salaries or fees of research workers, cost of materials used in research, expense of maintenance of equipment, and so on. Contributions, even of a capital nature made to technical colleges for technical education in relation to the particular trade of the firm or individual, are deductible as trading expenses. For depreciation of machinery and plant (a wide term, including motor vehicles, fittings and fixtures), the "wear and tear" yearly percentage allowances continue, and these are now plus one-fourth, instead of one-fifth as previously. For example, suppose a basic rate of 20 per cent. (*e.g.*, motor vehicles) be in operation, it now becomes 25 per cent. (20 per cent. plus one-fourth, 5 per cent.), instead of 24 per cent. as formerly. Furthermore, if machinery or plant is worked overtime or on shifts, additional wear and tear allowances for machinery, etc., are ordinarily obtainable on this account.

For the years subsequent to the present basic period (year ending April 5, 1946) there will be more allowances for machinery and plant, an "initial allowance" of capital expenditure on machinery being available in addition to the "wear and tear" allowances; also allowances for "industrial buildings," and also capital expenditure on scientific research (*e.g.*, pilot plants, laboratories, and other matters) will be allowed by five annual instalments, but all these matters are out of the scope of the present article, which relates to current assessments.

Under the present social insurance schemes, the amount of the employer's share of contributions is deductible as trading expenses, and these amounts, with the National Insurance Act in force, will be similarly allowed. Incidentally, increased pension contributions are payable from October, 1946, when pensions are increased in advance of the new scheme. Employees will be allowed the full amount of their share of contributions (previously only £1 was allowed), and also the self-employed persons paying under Class B. On the other hand, benefit payments received by a contributor (except maternity grant and death grant) will be assessable under Schedule E as earned income.

A point of importance to the "self-employed" is that, whereas any business income will be assessed under Schedule D on the "preceding year to assessment year basis," for benefits and pensions, the assessment is made under Schedule E on current year's earnings, and the two incomes together may cause different tax poundages (based on a sliding scale) to apply, according to the income as increased by Schedule E current tax assessments; up to £125 taxable income the poundage may be 3s. or 6s., afterwards, 9s.

EMPLOYMENT OF DISABLED PERSONS

As from September 1, 1946, the "standard percentage" for the purpose of the quota scheme under the Disabled Persons (Employment) Act, of 1944, is raised from 2 per cent. to 3 per cent.

For the calculation of the quota, a fraction less than one-half is ignored, but a fraction of one-half or more counts as a full unit. Thus, 3 per cent. of 20 producing 3/5, the employer of 20 workers would have a quota of one; a percentage of 3 applied to a total of 50 workers producing 1½, the employer of 50 workers would have a quota of two; on a total staff of 84, the quota becomes three; and so on.

Two new classes of employment are "designated" as specially suitable for disabled persons, namely, employment as a passenger electric lift attendant, and employment as a car park attendant. This means that an employer may not engage for such employment any person who is not registered as disabled, unless (*a*) the person is a former employee entitled to reinstatement, or (*b*) the employer obtains a permit from the Ministry of Labour on the ground that no registered disabled person is suitable and available. A permit will also be required for the transfer of a non-registered person to such employment.

SOME ARMY FOUNDRY EXPERIENCES

(*Continued from previous page.*)

"Probably we shall never know the exact amount of work which was accomplished by these engineering units in keeping the machines of war in full working order. But there can be no doubt at all that their work was very extensive and important indeed, and there is a great world debt to be paid to the fighting engineer."

MOULDING FROM BROKEN CASTINGS

By "TRAMP"

In jobbing work it is often essential to produce a casting in the shortest possible time to replace one that has been broken in service. Invariably no pattern for the particular casting is available and other methods have to be adopted, according to the capacity of the job. Occasionally it is possible that sweeping boards can be used, or a rough pattern knocked up quite quickly, but more often than not, the old casting has to serve as a pattern. When old castings are used in this way, much repairing of the mould is necessary, as the improvised pattern is not easily withdrawn from the sand. Occasionally, although the original casting was made in one particular way, the replacement may be produced easier by another method of moulding.

Fig. 1 shows a bracket broken across line AA. From the marks on the casting it could be seen that the original pattern was jointed along line BB, and the back C taken out in a core. As it would be somewhat difficult to mould by this method from the broken casting—the snag was to get the pods of sand D and E to draw cleanly, particularly the top half—it was decided to mould and cast the job on its flat.

The broken casting was utilised to produce two cores to form the pods D and E, and while these were drying, the casting, being filled with sand to the level of the edges of F and G, or the limits of the cores, a mould was made from this with joint along HH. The cores being dried, they were blackwashed and cooled off and then placed in the mould on perforated studs, no core prints being necessary. Tin head nails were used in the top to guard against "lift" when casting, and the job was made and delivered within a very short time of the breakage occurring.

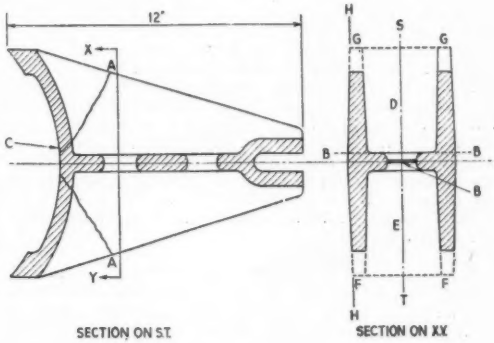


FIG. 1.

FILTER CORES

How many foundrymen, who daily use filter cores, know who invented them? According to "La Fonderie Belge" it was Brunelli, an Italian, who launched his project about 1919. After his death, Mr. Ivan Lamoureux, in September, 1932, published in "Revue de Fonderie," an appreciation of his work. Brunelli did not succeed in one step, as the modern high grade technician does in his daily wo but in several stages. —(1) With a more or less licated runner basin, sometimes of quite inge onstruction, which prevents the dirt to be associated with the initial pour from entering the runner; (2) with the runners constantly improving through use; cleansing started and the channels carefully cut, there is still much to do, and (3) with the slowing down of the speed at the end of the pouring. In recalling this work, "La Fonderie Belge" do not necessarily support all Brunelli's conclusions, but they deem it worth while to reprint as a reference to his conclusions in the following table.

It is not necessary to match the total of the pencil runners with a single runner of the same total section. A runner of 25 mm. diameter will yield much more metal than 10 pencil runners of 8 mm. If this diameter has been calculated, it has been done in order to figure the dimension of the single runner below which it is clearly necessary to go to ensure the filling of the mould at the speed desired by Brunelli. The single runner, however, will not bring about the filtering of the metal, and not only will the soundness of the casting be deficient or poor, but also the division of the graphite will also be affected.

TABLE I.—*Original Recommendations of Brunelli.*

Number of Pencil Runners Wanted.	Diameter of Each in mm.	Individual Section of Each Runner in sq. mm.	Total Section of the Runners in sq. mm.	Diameter of a Single Runner of the Same Section in mm.	Weight of the Casting to be Made in Kilogrammes.
1	4	12.5	12.5	4	1
1	7	39.5	39.5	7	10
5	4	12.5	62.8	9	20
5	7	39.5	197.5	16	70
10	5	19.7	197.0	16	160
10	8	50.0	500.0	25	400
16	8	50.0	800.0	32	1000

IRON AND STEEL BOARD APPOINTED

SIR ARCHIBALD FORBES AS CHAIRMAN

Sir Archibald Forbes has accepted the chairmanship of the Iron and Steel Board which is to be set up by the Ministry of Supply. He is a director of Spillers, Limited, the millers, and his appointment confirms the general impression that someone from outside the iron and steel industry would be invited to accept the chairmanship. The appointment is a full-time one, and will carry a salary of £8,500 per annum.

The other members of the Board comprise two representatives of the steel manufacturers in the persons of Mr. G. H. Latham and Mr. R. Mather, two representatives from the trade union side—Mr. A. Callighan and Mr. Lincoln Evans—and a Treasury expert, Sir Alan Barlow. They will be on a part-time basis, and will each receive £1,000 a year. Mr. A. C. Boddis, of the Ministry of Supply, has been appointed secretary of the Board. An additional member with experience of general industry is to be appointed. His name will be anonunced shortly.

Functions of the Board

The Board's main duties are officially stated as follow:—

(*a*) To review and supervise programmes of development needed for the modernisation of the iron and steel industry and to watch over the execution of approved schemes in such programmes.

(*b*) To supervise as necessary the industry in current matters, including the provision of its raw material requirements, and the administration, under powers delegated by the Minister, of such continued direct control as may be required over the production, distribution and import of iron and steel products.

(*c*) To advise on general price policy for the industry and on the fixing of prices for controlled products.

Biographical Notes

Sir Archibald Forbes, who is 43 years of age, was formerly a member of the firm of Thomson McLintock & Company, the accountants. In 1935, he became a director of Spillers, Limited, and he is also a director of certain other companies. He was released by Spillers in 1940 to join the staff of the Air Ministry. In June, 1941, he was appointed Deputy Secretary of the Ministry of Aircraft Production, and he subsequently took over also the post of Controller of Repair, Equipment and Overseas Supplies.

Sir Alan Barlow, Bt., has been a Joint Second Secretary of the Treasury since 1942.

Mr. A. Callighan became national president in 1939 of the National Union of Blast Furnacemen, Ore Miners, Coke Workers and Kindred Trades, and became general secretary of the Union in November of that year. He has had long experience of trade union and local Government activities, particularly on the North-West Coast.

Mr. Lincoln Evans became assistant general secretary of the Iron and Steel Trades Confederation in 1936 and succeeded Mr. John Brown as general secretary of the Confederation early this year. He was elected to the General Council of the T.U.C. in 1945 and is a member of the T.U.C. Advisory Committee on the coal-mining industry.

Mr. G. H. Latham, J.P., has had over 40 years' experience with the Whitehead Iron & Steel Company, Limited, of which he is now chairman and managing director. He also acted for a period as managing director of Richard Thomas & Company, Limited. He is president-elect of the British Iron and Steel Federation, a vice-president of the Iron and Steel Institute, and technical adviser for the steel industry on the Finance Corporation for Industry.

Mr. Richard Mather is chairman and managing director of the Skinningrove Iron Company, Limited. He was technical adviser to the Indian Tariff Board in 1923-24 and again in 1926-27, and was technical director of the Tata Iron & Steel Company from 1930-40.

CRAWLER TRACTORS, EXCAVATORS AND CRAWLER CRANES

Owing to the limited supply of crawler tractors, excavators and crawler cranes for essential purposes, the Ministry of Supply, as the production authority for contractors' new plant, and the disposal authority for Government surplus plant, announces that an inter-departmental committee has been set up to advise on the allocation of such plant. So that their claims may be adequately represented to the inter-departmental committee, prospective purchasers of such plant should apply to the appropriate sponsoring department.

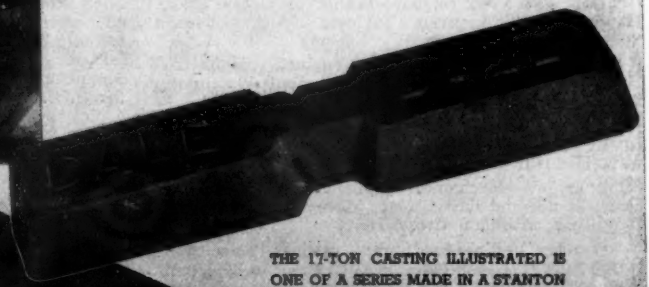
In the case of firms producing raw materials for iron and steel, non-ferrous metals and heavy engineering industries, it is the Ministry of Supply, Department M.2, Shell Mex House, Strand, London, W.C.2; for firms engaged upon the production of materials for the timber, paper, chemicals, ball and china clay industries, it is the Board of Trade, Priorities Division, I.C.I. House, Millbank, London, S.W.1, while for the export agencies it is the Ministry of Supply, Engineering Industries Division, Shell Mex House.

THE ENGINEERING TRADES AND METALS DEPARTMENTS of Imperial Chemical Industries, Limited, are now at Gloucester House, 149, Park Lane, London, W.1. Other departments of the southern region sales office at present at Mill Hill are scheduled to return to London to-morrow (Friday).

MR. WILLIAM BATT, who was vice-chairman of the American War Production Board and representative of the United States on the Combined Production and Resources Board, is paying a short visit to this country. He will address the Institution of Mechanical Engineers and representatives of the other British engineering institutions, on the progress being made by the United States in the unification of engineering standards between the countries using the inch system of measurement.

STANTON-DALE
REFINED PIG IRON

Manufactured to guaranteed analyses in seven standard grades. Also obtainable to individual specification



THE 17-TON CASTING ILLUSTRATED IS ONE OF A SERIES MADE IN A STANTON FOUNDRY FROM STANTON DALE IRON

1. Core being lowered into mould
2. Pouring the metal
3. Finished casting in transit

The
STANTON IRONWORKS
COMPANY LIMITED
NEAR NOTTINGHAM

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"DORIUM"—Metals and alloys. WINIFRED MAY WALLER, 28, Kingsfield Road, Oxhey, Watford, Herts.

"SOLUFEEDER"—Agricultural and horticultural feeding machines. PLANT PROTECTION, LIMITED, Yalding, Kent.

"BOFFIN"—Wringing, washing and ironing machines, etc. WALTER RAYLOR, 20, Westbourne Road, Birkdale, Southport.

"DURATHENE"—Thermo-plastic mouldable material. DURATUBE & WIRE, LIMITED, 16, Hanworth Road, Feltham, Middx.

"HARCROS"—Mangles, rolling machines, etc. HARRISONS & CROSFIELD, LIMITED, 1-4, Great Tower Street, London, E.C.3.

"DH" AND HAWK DEVICE—Textile machinery. DIXON HAWKESWORTH, LIMITED, Taylorac Works, Hanson Street, Middleton, Lancs.

"BRÛT"—Cylinder liners for engines. RICHMOND UTILITIES (BRADFORD), LIMITED, Richmond Warehouse, Richmond Road, Bradford.

"ARDITE"—Welding rods. HARD METAL TOOLS, LIMITED, Fletchamstead Works, Fletchamstead Highway, Tile Hill Lane, Coventry.

"BURRUN"—Mechanical apparatus for spraying gases, liquids and dusts. GEO. MONRO, LIMITED, Hertford Road, Waltham Cross, Herts.

"SECUREX"—Pipes and tubes, castings, bolts, nuts, etc. JAMES H. LAMONT & COMPANY, LIMITED, Gylemuir Works, Gylemuir Road, Corstorphine, Edinburgh.

U.K. ALUMINIUM OUTPUT

Production of virgin aluminium in the United Kingdom in the second quarter of this year amounted to 8,068 tons, against 8,264 tons in the first quarter. Secondary ingot production was 9,856 tons, compared with a corrected figure of 10,358 tons. Consumption of virgin metal in the same period amounted to 27,400 tons (including 2,292 tons lent to France), against 23,900 tons, and of scrap 14,184 tons, against 13,004 tons. Only 380 tons were imported, compared with 1,270 tons in the first quarter. Imports in July increased to 16,430 tons.

AUSTRALIAN TUBE MERGER

Tube Makers of Australia, Limited, has been floated with a nominal capital of £3,000,000, in £1 shares, to merge the interests of Stewarts and Lloyds (Australia), Pty., Limited, and British Tube Mills Australia Pty., Limited. While these two concerns will continue to function as separate entities, all project planning will be co-ordinated. Of an initial issue of 2,037,502 shares. 893,205 will be held by Stewarts and Lloyds, Limited; 853,179 by the Broken Hill Proprietary Company, Limited; and 286,116 by Tube Investments, Limited.

PERSONAL

MR. S. HENSHAW has, on medical grounds, resigned his seat on the board of the Staveley Coal & Iron Company, Limited.

MR. J. V. BARLOW, secretary of West's Gas Improvement Company, Limited, for the past 22 years, has retired. He is succeeded by MR. J. BEATY.

MR. JAMES CAMERON, cashier and office manager of John Lang & Sons, Limited, ironfounders and lathe manufacturers, of Johnstone, near Glasgow, has retired after 58 years with the company.

MR. J. GRAY BUCHANAN, J.P., chairman of William Jacks & Company, Limited, Winchester House, Old Broad Street, London, E.C.2, this month celebrates the sixtieth anniversary of his joining the company. Congratulations to the G.O.M. of the iron merchants!

MR. AND MRS. C. E. WILLIAMS, of "Coniston," Cefn Coed Road, Cardiff, celebrated their golden wedding on September 2. Mr. Williams was president of the Institute of British Foundrymen in 1933 and his successful year of office and work for the industry have been commemorated for all time by the establishment of the C. E. Williams annual lecture.

INCREASED ELECTRICITY GENERATING CAPACITY

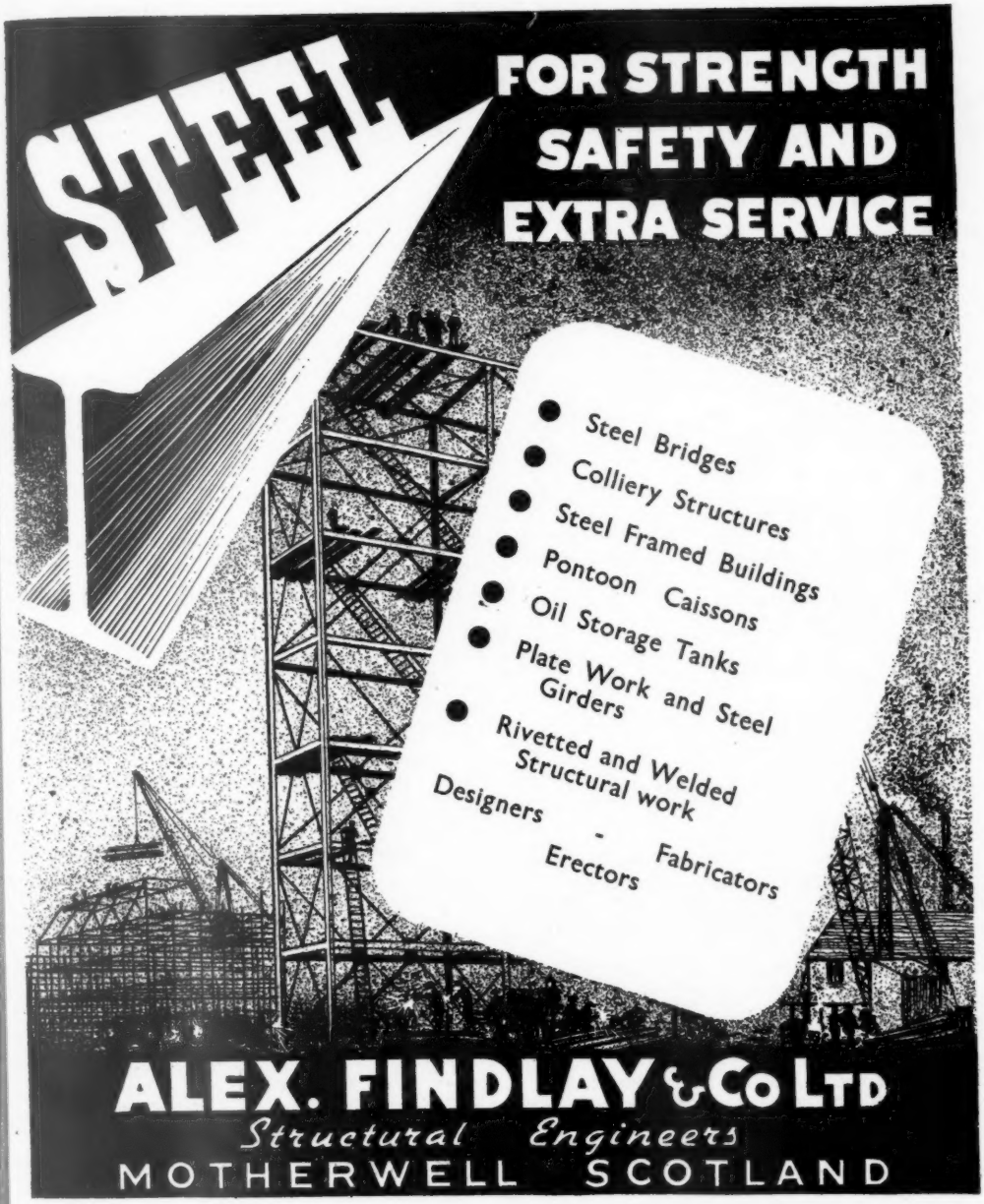
The Central Electricity Board has, during the year, arranged with authorised undertakings for an increase of the generating capacity of selected stations associated with the grid by 1,029,000 k.w. at an estimated cost to the station owners of nearly £40,000,000. Of this total, 339,000 k.w. are due for commissioning by the winter of 1948, and 690,000 k.w. by the winter of 1949. Provision is made for the first sections of four of the 18 proposed new stations mentioned in the board's annual report for 1945. With the authorised undertakings, the board is now preparing a programme of plant extensions for 1950 which will give a further increase of generating capacity of some 1,470,000 k.w.

CONTROL OF LIGHT METALS

The work of the Light Metals Control office of the Ministry of Supply has been transferred to the Ministry's Metal Division, Mr. C. G. McAuliffe being released from his appointment as Controller of Light Metals.

Inquiries and correspondence on metal supplies should be addressed to the Ministry of Supply, M.4 (Trading), Southam Road, Banbury, Oxon; on statistics and licences to M.4 (Statistics) (address as above); and on matters relating to production to the Ministry of Supply, M.4 (Production), Shell Mex House, Strand, London, W.C.2.

THE HOFFMANN MANUFACTURING COMPANY, LIMITED, are not to proceed with their plan to establish a ball-bearing factory at Hillington, Glasgow.



Head Office: PARKNEUK WORKS, MOTHERWELL, SCOTLAND.
London Office: HIGH HOLBORN HOUSE, 52/54 HIGH HOLBORN, W.C.I.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patent)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. *each.*

577,301 PRESSED STEEL COMPANY, LIMITED, SIMMIE, W. S., and ALDRED, F. C. Means for dressing welding electrodes.

577,389 BIRMINGHAM ALUMINIUM CASTING (1903) COMPANY, LIMITED, PRITCHARD, B. F., SHERLOCK, W. N., and TINSLEY, L. Casting of metals.

577,451 FAIREY AVIATION COMPANY, LIMITED, and WELHAM, G. L. F. Flanging of sheet metal plates, strips, etc.

577,504 SAMUEL, R. L., LOCKINGTON, N. A., and METALS INTERCHANGE SYNDICATE, LIMITED. Process for the diffusion of metals into iron and steel.

577,512 STEEL CEILINGS, LIMITED, and PENKALA, E. Composite metal beams or the like.

577,547 POLDEN, S. G., and AYLAND, L. F. Joists, beams, girders, etc.

577,554 INTERNATIONAL MEEHANITE METAL COMPANY, LIMITED, and CURRIE, E. M. Apparatus for the determination of the fluidity of molten metals.

577,567 LARSSEN, G. HAGERUP-. Electrode frame structures for electric furnaces.

577,714 MALLORY METALLURGICAL PRODUCTS, LIMITED. Thermostatic metals.

577,731 HIGH DUTY ALLOYS, LIMITED, PRYTHERCH, W. E., and WHITBY, L. Process for protecting magnesium and magnesium-rich alloys against corrosion.

577,765 TECALEMIT, LIMITED, and LE CLAIR, C. C. S. Reinforced porous metal or alloy members.

577,789 PRISTON, H. R., and CLARKE, S. G. Production of antimony coatings on iron and steel.

577,793 GENERAL ELECTRIC COMPANY, LIMITED, and HAINSWORTH, J. Electric furnaces for the bright annealing of metals.

577,798 MANGANESE BRONZE & BRASS COMPANY, LIMITED, and ROBSON, E. Manufacture of sintered metal compositions.

577,858 HURLEY, T. F., and PERCIVAL, G. Forced-draft furnace fronts for marine boilers.

577,892 HATFIELD, W. H., and GREEN, H. Alloy steels.

577,973 GENERAL ELECTRIC COMPANY, LIMITED, and MORRIS, C. H. Welding of the junctions between tubes and plates.

577,986 ALEXANDER, W. O., and IMPERIAL CHEMICAL INDUSTRIES, LIMITED. Manufacture of composite metal articles.

578,023 ROBIETTE, A. G. E., and HANCOCK, P. F. Melting of metals.

578,066 KRYSZEK, S., HARD ALLOYS, LIMITED, and CALEDONIAN METAL COMPANY, LIMITED. Drawing dies.

578,069 DU PONT DE NEMOURS & COMPANY, E. I., and BLACKBURN, N. F. Electrodeposition of tin.

578,123 FORD MOTOR COMPANY, LIMITED. Casting of metals.

578,165 LUX, E. Refractory lining for melting pots used in the alumino-thermic extraction of metals.

578,193 GENERAL ELECTRIC COMPANY, LIMITED, and CHIRNSIDE, R. C. Manufacture of nickel-iron alloys.

578,249 ALUMINIUM LABORATORIES, LIMITED. Recuperative heat-treatment furnace.

578,283 BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION, LIDDIARD, E. A. G., BAILEY, G. L., and MAY, R. Alloy.

578,296 CLAY CROSS COMPANY, LIMITED, and JERVIS, F. Manufacture of metal castings by the centrifugal method.

578,346 CALLENDER'S CABLE & CONSTRUCTION COMPANY, LIMITED, and DEAN, G. J. Machines for the preparation of diamond dies for wire drawing.

578,373 FORD MOTOR COMPANY, LIMITED. Mould for casting engine crankshafts.

578,389 MALLORY METALLURGICAL PRODUCTS, LIMITED. Electrodeposition of metals and alloys.

578,977 STONE & COMPANY, LIMITED, J., PAYNE, R. J. M., and MURPHY, A. J. Treatment of magnesium base alloys and the production of pressure die-castings therefrom.

579,060 HONE, A., and ALUMINIUM LABORATORIES, LIMITED. Method of separating ingots in a continuous casting process.

579,076 BOOTH, C. H., and BRIDGE, J. F. Method of machining metals and other materials.

579,163-4-5 ESSEX AERO, LIMITED, CROSS, R. J., and MAILLARD, E. F. Prevention of corrosion of magnesium and magnesium-base alloys.

579,202 ARMOUR RESEARCH FOUNDATION. Electrical methods of and apparatus for determining the thickness of metal coatings.

579,221 BERNUTH, LEMBCKE COMPANY, INC. Rail spike.

579,252 POWER JETS, LIMITED, and WALKER, D. N. Ball and roller bearings.

579,327 HALL, H. C., and GRESHAM, H. E. Material for moulds for casting metals.

579,436 WHESSOE FOUNDRY & ENGINEERING COMPANY, LIMITED, and NELSON, A. Welded joints.

579,437 STEWART, J. S. Blast furnaces.

579,469 FORD MOTOR COMPANY, LIMITED. Method and mould for casting thin-walled flat articles.

579,479 ARNOLD, J. C. (Coast Metals, Inc.). Ferrous alloys.

579,527 TUCKER, N. A., and MALLORY METALLURGICAL PRODUCTS, LIMITED. Resistance welding apparatus.

579,606 BOOL, E. D., and BRIDGE, J. F. Metal rolling mills.

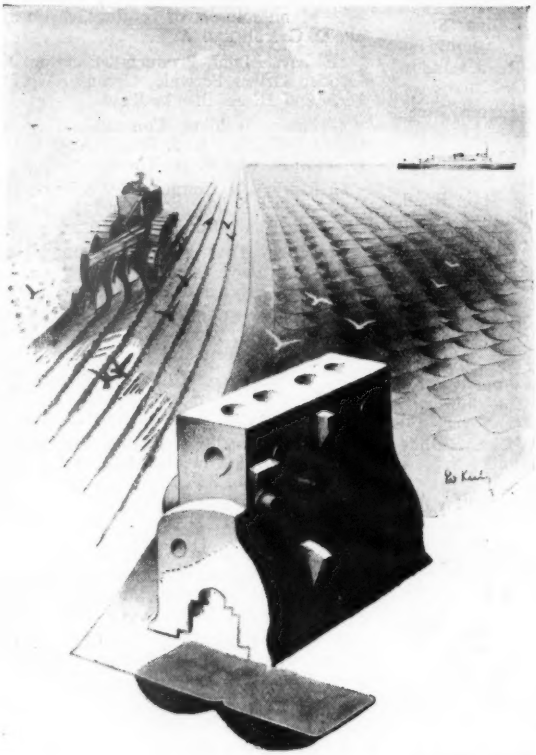
579,616 SPECIALLOID, LIMITED, and ROBINSON, A. S. Light metal and light metal alloy pistons.

579,617 FORD MOTOR COMPANY, LIMITED, RENSHAW, E. S., and SARGOOD, S. J. Cupola-type furnaces.

579,633 MORRIS MOTORS, LIMITED, and SHAW, J. H. Machine for reclaiming foundry sand.

579,643 MOND NICKEL COMPANY, LIMITED (International Nickel Company, Inc.). Alloys containing manganese.

WORKINGTON CYLINDER IRONS



High-duty irons of suitable compositions for cylinders, chemical use, wear resistance and other special needs are readily achieved by using Workington Hematite Irons or "UCO" Cylinder Irons in the mixture. Machine cast and free from sand and unwieldy pieces, of uniform composition throughout each cast, easily handled, quick melting, requiring much less coke and lime in the cupola than ordinary pig, they meet the requirements of modern foundry practice.

THE UNITED STEEL COMPANIES LTD

WORKINGTON IRON & STEEL COMPANY

WORKINGTON Telephone: Workington 206 Telegrams: "Mosbay," Workington CUMBERLAND

Branch of The United Steel Companies Limited

W. 76

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Garrick Engineering Company, 71, King Street, Manchester, 2—£2,000. E. Bennett and W. Smith.

South London Pistons, 194, Old Kent Road, London, S.E.1—£10,000. C. W. Waters and H. D. Mundy.

Bankfield Engineering Company, 1, Hoghton Street, Southport—£2,000. W. G. Beaver and J. F. Leslie.

London Products (Metal & Plastics), 44a, Worship Street, London, E.C.2—£1,000. L. B., and I. Seifert.

G. H. Coy (Engineers), Holding No. 12, Main Road, Risley, Derbyshire—£2,000. A. E. Harder and G. H. Coy.

Hollis Metal Products, 123, Church Street, Blackpool—£1,000. W. H. and E. L. Lister, and S. and D. Holt.

Alfred Hall & Sons (Sheet Metal Workers), Crown Close, Bromsgrove, Worcs—£2,000. A., H. H. and A. Hall.

Arthur Hudson Forge & Engineering Company, Mill Lane, Brighouse, Yorks.—£4,000. A. and E. Hudson.

A. Freeman (Engineers), Talbot Works, Talbot Road, Wellingborough—£7,000. A. and A. D. Freeman.

Scottish Alloys, Block 22, Watt Road, Hillington, Glasgow—£25,000. L. Bisset, J. H. Flynn, and W. Menzies.

E. F. Tart, 19, Bedford Street, Gloucester—Engineers, etc. £2,000. E. F. and E. E. Tart, and D. E. Faulkner.

Foundry Flux, 220, Park Road, Hockley, Birmingham, 18—£1,000. F. Gilliver, N. and L. S. Richards.

M. Howey & Son, Roker Park Garage, Roker Baths Road, Sunderland—Engineers, etc. £15,000. P. Howey.

C. J. Sims, Abbey House, 2, Victoria Street, London, S.W.1—Engineers, etc. £10,000. C. J. S. Sims and R. C. Cooney.

Harmak Tube & Metal Sales, Eagle House, Jermyn Street, London, S.W.1—£1,000. E. R. Hook, A. M. and H. R. Richardson.

Castle-Bar Engineering Company, 207, Bradford Road, Castle Bromwich—£2,000. C. J. Samuels, H. Burton, and G. E. Child.

Boldalloy, 179-181, Cross Lane, Salford, 5—Manufacturers of cemented carbide products and machine tools. £12,500. H. and L. Bold.

Gordon Laycock & Partners, Glebe House, Headingley, Leeds, 6—Engineers, etc. £10,000. W. G. Laycock and J. P. Sowden.

Crawcast—Ironfounders, steelmakers, etc. £1,500. T. B. Riley, G. Ward, and S. T. Diggle, 9, Palatine Terrace, Norden, Rochdale.

Joseph Hipkiss & Company, 848, Bristol Road, Selly Oak, Birmingham—Ironmasters, founders, etc. £1,000. F. V. Salt and R. Grainger.

W. D. Carroll, 40, Ramsey Road, Acton, London, W.—Manufacturers of forgings, castings, etc. £1,500. W. D. Carroll and A. L. East.

Modern Metal Products (Catering Engineers), 25, Hodder Drive, Perivale, Greenford—£1,000. J. S. L. Kerr and H. A. Brooke-Read.

Gomm's Welding Company, East Canal Wharf, Cardiff—£1,250. R. J. Frisk, G. A. and L. W. Gomm, J. Marriott, and F. A. Thomas.

C. Mordey & Company—Welding specialists, engineers, etc. £1,000. C. and D. H. F. Mordey, 2, Rhodesia Road, London, S.W.9.

Frederick Tool & Engineering Company, Loma Works, Fitzroy Street, Ashton-under-Lyne, Lancs—£1,000. S. Scott and B. Rhodes.

Goldenhill Foundry, 7, King Street, Newcastle, Staffs—£1,000. W. E. Welsby, J. E. Raybone, W. J. Scragg, H. Cepper, and D. White.

W. H. Saunders, Clipstone Street, London, W.1—Manufacturers of metal and wire work, etc. £2,000. N. H. Straus and A. B. D. Spiro.

Auto-Components & Engineering Company, 31, John Street, Bedford Row, London, W.C.1—£3,000. A. G. Joiner, senr., and A. G. Joiner, junr.

Moor Industries (Uxbridge), 5, Belmont Road, Uxbridge—Ironfounders, steel manufacturers, etc. £4,000. G. H. and H. A. Scouse.

Southern Counties Engineering Company (Mitcham), London Road, Mitcham, Surrey—£3,000. A. Bowyer, W. G. Haywood and W. A. Sayers.

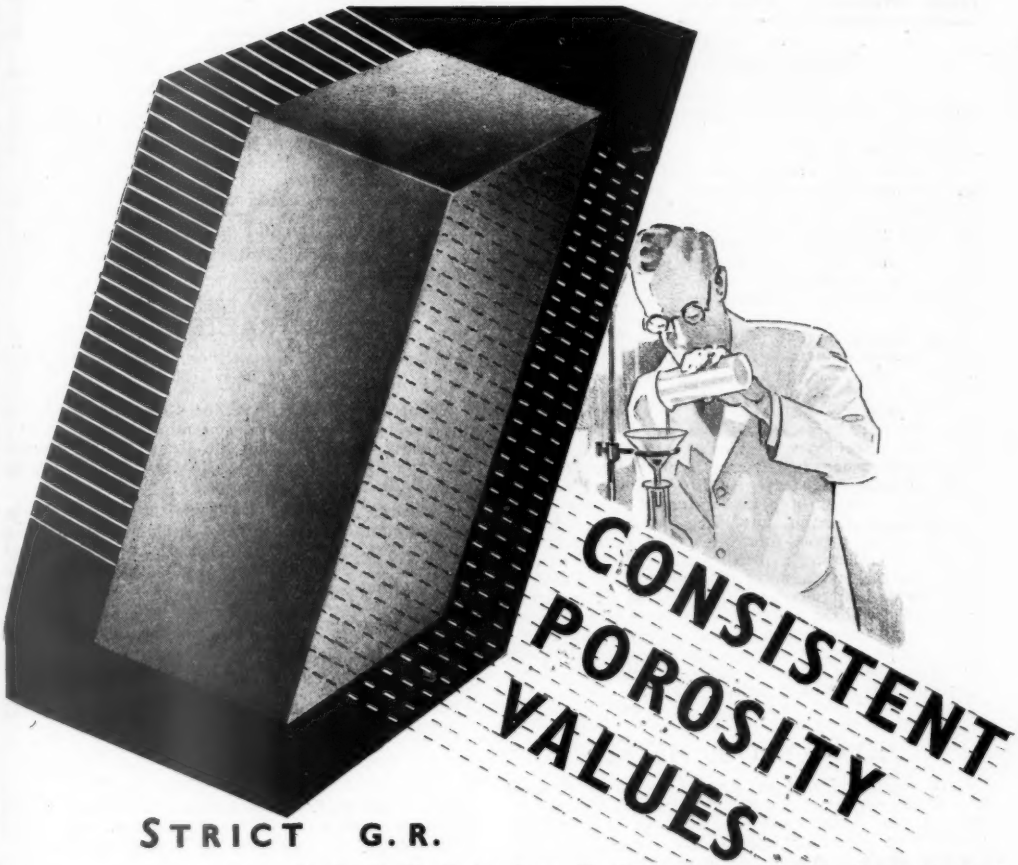
M. S. K. Engineering Company—£1,000. W. V. Morgan, H. Stokes, and R. L. Kingsnorth, 5, Vicarage Road, King's Heath, Birmingham, 14.

Shaws (Coalville), 52, Silver Street, Whitwick, Coalville, Leics—Mechanical engineers, etc. £2,000. S. W. C. Shaw and R. T. Humphrey.

Deccospray, 1-3, Haddonhall Street, London, S.E.1—Engineers, metal finishers, sprayers, etc. £1,500. D. C., J. W., S. A. and C. A. Jackson.

OVER THE QUESTION OF working hours, men employed in the moulding department at the Albion Ironworks of Harrison, McGregor & Company, Limited, of Leigh, Lancs, last week walked out in protest, but resumed work again next day.

JAMES MACKIE & SONS, LIMITED, Albert Foundry, Springfield Road, Belfast, textile machinery makers, are engaged in mechanising their foundry on the production line system. We offer our congratulations to the company on the attainment of their centenary. The firm is still very much a family concern, Mr. T. F. Mackie, son of the founder, being chairman, assisted by his son and five nephews.



STRICT G.R.

MANUFACTURING CONTROL

CONSISTENT porosity values are maintained at all "G.R." works within very narrow limits by controlling the quality of raw materials, gradings, tempering, pressing and firing. Porosity tests are one of several applied regularly throughout the daily manufacturing schedule. They provide tangible evidence of the maintenance of those highly prized characteristics of G.R. products—reliability and length of service. "G.R." engineers are available for advice on the choice and application of refractories and are at the service of executives in all industries using refractories.

FIREBRICKS · BASIC BRICKS
ACID-RESISTING MATERIALS
INSULATION · SILLIMANITE
AND HIGH ALUMINA BRICKS
SILICA BRICKS · PATCHING
AND RAMMING MATERIALS
REFRACTORY CEMENTS · SANDS
187

GENERAL REFRACTORIES
LIMITED
GENEFAX HOUSE · SHEFFIELD 10 TELEPHONE · SHEFFIELD 31113

Raw Material Markets

IRON AND STEEL

The slow recruitment of skilled labour is retarding the hoped-for expansion in the production of light castings. This, in fact, is one of the bottlenecks encountered by the builders, but it is manifest that if more labour were available the need for more foundry pig-iron would immediately arise, current production being barely sufficient for present needs. Nor is there any surplus of other grades of pig-iron. Requisitions from the engineering foundries are on a heavier scale, reflecting the expanding activities of these establishments, and although licences are still fairly readily obtainable, stringent conditions may develop in the near future.

It is understood that the Control is making special efforts to acquire increased tonnages of steel semis from overseas. Naturally, on a pronouncedly sellers' market, prices are high, but a few cargoes continue to arrive and are promptly distributed to those establishments where the need is greatest. Pressure for both prime billets and sheet bars is intense, and the position is certainly no easier than it was a few weeks ago.

August returns are expected to show some contraction in the exports of plates and sheets owing to the heavier home demand, but there has been some expansion in the export trade in special steels and also in steel rails, sleepers and fish plates. Rollers of steel plates will do well to meet their present commitments up to the end of the year without taking on any more orders; at the sheet mills the congestion is even more acute. Full employment for all departments of the steel trade is, in fact, assured, and there is little scope for the acceptance of new business unless a wide latitude is extended in regard to delivery dates.

NON-FERROUS METALS

It is understood that the United States Government has already accepted the British Government's invitation to the main tin-consuming and tin-producing countries to attend an international tin conference in London which is expected to open about October 8. Other countries invited are Belgium, Bolivia, China, France, the Netherlands, Siam, and the Soviet Union. The object of the conference is to consider the prospective world tin position and whether any continuous inter-governmental study of that position is necessary.

Following the recent labour troubles, production in the Northern Rhodesia copper belt is now threatened by a serious shortage of coal. Operations at the mines, it is feared, may have to be temporarily curtailed.

Shortage of lead continues to handicap consumers, all of whom are receiving supplies well below their requirements. The outlook is by no means promising and users in this country are likely to be rationed for some time to come.

As from Monday last the price of virgin aluminium in ingot or notch bar form was increased from £67 to £72 15s. per long ton, delivered into consumers' works. The new price applies to metal of a purity of 99 per cent. to 99.5 per cent. inclusive, with premiums as follows for higher purities:—Minimum 99.6 per cent., £80 15s.; 99.7 per cent., £84 15s.; 99.8 per cent., £89 15s.; 99.9 per cent., £122 15s.; 99.99 per cent., £172 15s. This increase in price is consequent upon the cost of metal under the Ministry's Canadian contract having risen on account of the change in the rate of exchange. Earlier this year the Ministry of Supply contracted to purchase 215,000 metric tons of aluminium from Canada during this year and next. The favourable terms of the contract enabled the domestic consumers' price in this country to be reduced to £67, or below what was considered to be the cost of British production.

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Chapel-en-le-Frith, September 21—Construction of approx. 1½ miles of 9-in. and 6-in. drains, ½ mile of 3-in. water main, etc., for the Rural District Council. Brady & Partington, engineers, Market Street, Chapel-en-le-Frith. (Fee £5, returnable.)

Coleford, September 23—Provision, laying and jointing of about 2,040 yds. of 8-in. spun-iron water mains, etc., for the West Dean Rural District Council. Willcox, Raikes & Marshall, engineers, 33, Great Charles Street, Birmingham, 3. (Fee £5 5s., returnable.)

Fleet, September 30—Construction of approx. 2¼ miles of iron and stoneware sewers, 8 in. to 10 in. dia., together with manholes and small motor house, for the Urban District Council. The Surveyor, Council Offices, Fleet, Hants. (Fee £2, returnable.)

OBITUARY

MR. GEORGE EGERTON LAMBERT, manager of the export department of Bamfords, Limited, agricultural engineers, etc., of Uttoxeter, Staffs, died recently.

MR. GILBERT GLEDHILL, who died last week, was a director of G. H. Gledhill & Sons, Limited, manufacturers of time recorders and precision tools, of Halifax, and Gledhill-Brook Time Recorders, Limited, of Huddersfield. Born in 1889, Mr. Gledhill was Conservative M.P. for Halifax from 1931 to 1945.

THE LATE MR. E. J. POCOCK, details of whose will were published in a recent issue, was a director of the G.K.S. Combustion Company, Limited, and Pocock, Chapman & Company, Limited, engineers, boiler makers, etc. He had a close business relationship with Goulds Foundries, Limited, of Newport, Mon., and with the Mountstuart Dry Docks, Limited, although he was not a director of these companies, as stated in our earlier note.